REMARKS / ARGUMENTS

In the above-identified Office Action the Examiner has rejected claims 2 and 4-6 under 35 U.S.C. Section 103a as unpatentable over Weber et al.

Applicant believes that the Examiner has misinterpreted Weber et al. to refer to Weber's parameters as a pulling speed. The parameters of Weber, in fact, refer to growth fluctuations during the pulling of the single crystal. As stated in the previous Amendment, Applicant is controlling the pulling-up speed so as to make the crystal diameter conform to a target value. This is explained in more detail below.

The present invention relates to the manufacture of a single crystal and involves the computation of the deviation between the crystal diameter measured during the pulling up operation and a target crystal diameter, and adjusting the pulling-up speed (as adjustable value) so as to make this computed deviation zero, or, in other words, to make the pulled crystal diameter constant.

Generally, in manufacturing the single crystal with the above method, there is a variation in the impurity concentration, which makes it difficult to manufacture a wafer having a good planarity after machining.

The present inventors have found that the cause of the variation in impurity concentration in the single crystal closely relates to the amount of fluctuation in the pulling-up speed, and this variation in impurity concentration can be reduced by applying the method of the subject invention.

In other words, in the present invention, the deviation between the crystal diameter measured during pulling-up and the target crystal diameter is computed, the pulling-up speed is adjusted so as to make the computed deviation zero (i.e., to make the diameter of the crystal to be pulled constant). The present invention has the distinctive feature whereby when adjusting the pulling-up speed, a prescribed limit is set

to the amount of adjustment of the pulling-up speed such that the pulling-up speed fluctuation for every 10 seconds is under 0.025 mm/min.

With the method above, a single crystal having a constant crystal diameter is obtained, and because a limit is set to the variation in the pulling-up speed, the impurity concentration in the pulled-up single crystal is made more uniform.

On the other hand, Weber et al. does not relate to the method of the present invention in which the single crystal is manufactured by computing the deviation between the crystal diameter measured during the pulling up operation and the target crystal diameter, and adjusting the pulling-up speed so as to make the computed deviation zero, i.e., to make the crystal diameter to be pulled constant.

Weber et al. teaches a method whereby the growth fluctuations are kept within a proposed range during the pulling of the single crystal and are controlled so as to fall within ± 0.3mm/min (the specific description of how to control it within ± 0.3mm/min is not provided).

Therefore, it is impossible for the method of the cited document, which does not recognize the concept of the method of the present invention and cannot manufacture a single crystal by adjusting the pulling-up speed so as to make the crystal diameter constant. Additionally, the allowable range of the fluctuation of the pulling-up speed of the cited document is large as compared with the present invention. If the single crystal is pulled-up under such a large allowable range, a correspondingly large variation in impurity concentration may occur in the single crystal.

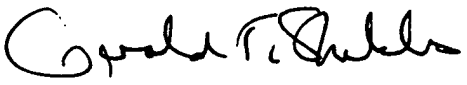
Thus, Weber et al. does not teach the control of growth fluctuations through a control of the pulling rate of the single crystal.

Applicant hereby requests reconsideration and reexamination thereof.

No further fee or petition is believed to be necessary. However, should any further fee be needed, please charge our Deposit Account No. 23-0920, and deem this paper to be the required petition.

With the above amendments and remarks, this application is considered ready for allowance and applicant earnestly solicits an early notice of same. Should the Examiner be of the opinion that a telephone conference would expedite prosecution of the subject application, he is respectfully requested to call the undersigned at the below listed number.

Respectfully submitted,



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